DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15 rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al (Biotransformation of Acrylonitrile, Biotechnology and Bioengineering, vol 34 pp 380-386 (1989)), herein Hwang (cited in a previous Office Action) in combination with Abe et al (US patent 5476883) herein Abe, Ishii et al (US patent 6043061) herein Ishii (cited in a previous Office Action) and Murao et al (WO 02/50297 and US publication 2004/0048348) herein Murao (cited in a previous Office Action)

Hwang discloses a method for producing an acrylamide polymer comprising hydrating of acrylonitrile (ACN) with following enzymatic conversion of ACN to acrylamide and polymerizing monomers containing the acrylamide (p.381-382).

The enzymatic method carried out using microbial cells of a Nitrile Hydrataze as a catalyst (p.380-381).

Regarding limitation of claim 1, stating that the acrylamide polymer is white in the form of a powder and is colorless in the form of an aqueous solution, since Hwang's polymer, modified with Abe and Ishii, would have the same structure as one, disclosed in the application examined, it would be expected that Hwang's Acrylamide would form white powder or colorless solution.

Regarding new limitation of claims 1 and 11 claiming polymerization temperature of 10-90C, Hwang discloses a polymerisation temperature of 10C.

Hwang does not disclose that concentration of Oxazole is less than 5 mg/kg or less and Hydrogen Cyanide concentration is 1 mg/kg or less.

Abe discloses a preparation process of Acrylamide from purified Acrylonitrile with following polymerization to Acrylamide polymer (see Example 1), where Oxazole is completely removed from Acrylonitrile (See Table 1, Example 1, where Oxazole is not detected with detection limit of 1.0 mg/kg (ppm)). Abe teaches that Acrylonitrile undergoes a purification procedure (see column 8, line 35), where Oxazole concentration reduces from 25 mg/kg to non-detectable limit (below 1 mg/kg) (see Table 1). Abe discloses that acrylamide required to be promptly dissolved in water with only trace amount of unreacted toxic monomer permitted (see Column 1, line 35).

Note that both Application and Abe teach that oxazole does not participate in the polymerization process, but contributes to water insoluble unreacted monomer (see

Spec pages 2 and 3), affecting color (Spec) and toxicity (Abe) of the polymer. Therefore, the presence of oxazole as an impurity of the starting material is undesirable in any process of acrylamide production.

Abe teaches that Acrylamide, which has been synthesized by subjecting the Acrylonitrile to hydration has higher stability and when polymerized, provides an aqueous solution of higher viscosity compared with Acrylamide synthesized likewise from oxazole-containing Acrylonitrile (Column 2, line 20).

Ishii teaches a process for producing Acrylamide by enzymatically hydrating Acrylonitrile (see Example 1), where concentration of Hydrogen Cyanide is equal or less than 1 mg/kg (see Examples 1-3 and Tables 1-3).

Ishii teaches that decreasing a concentration of Hydrogen Cyanide leads to lowering a deactivation rate of an enzyme (See Column 6, line 65).

Therefore, it would have been obvious to a person of ordinary skills in the art at the time the invention was made to use Acrylonitrile with Oxazole concentration of 5 mg/kg or less and Hydrogen Cyanide concentration is 1 mg/kg or less in order to produce polyacrylamide with high viscosity and achieve higher catalytic activity of the enzyme (which relates to Hydrogen Cyanide) and to decrease insoluble toxic monomer content in the polymer (which relates to Oxazole).

Hwang does not disclose that the reaction carries until the concentration of Acrylamide riches at least 30% by mass or more.

Murao teaches an enzymatic process of Acrylonitrile conversion to Acrylamide at the presence of microbial cell of a Nitride Hydrates, where reaction carries until Acrylamide concentration reaches 45% mass (see Example 1).

Therefore, it would have been obvious to a person of ordinary skills in the art at the time the invention was made to carry out the conversion of Acrylonitrile to Acrylamide until Acrylamide reaches the concentration of 30% mass or more in order to make economically sound process.

Response to Arguments

Applicant's arguments filed 3/09/2010 have been fully considered but they are not persuasive.

Regarding Hwang Applicant submits that:

1. The Reference does not disclose the polymerization tempererature within the range of 10-90C.

2. The reference does not teach white powder.

Regarding (1), Hwang clearly discloses the following procedure of acrylamide polymerization:

The cells (10 g wet wt) were suspended in water (40 mL) and added to a solution of monomer (4.5 g acrylamide) and crosslinker (0.5 g NN-methylene bisacrylamide). The polymerization was initiated by the addition of 5% (v/v) a-dimethylaminopropionitrile (5 mL) and 2.5% (w/v) potassium persulfate (10 mL). **Polymerization was performed in a cold chamber (10 C).** The gel block was then cut into cubes, and these were then thoroughly washed with water in order to remove nonpolymerized monomers and residues.

Regarding (2), Examiner has never stated that Hwang discloses a white powder. However, both Application and Abe teach that oxazole does not participate in the polymerization process, but contributes to water insoluble unreacted monomer (see Spec pages 2 and 3), affecting color (Spec) and toxicity (Abe) of the polymer.

Therefore, Oxazole removal with Abe's procedure from Hwang's synthetic composition will lead to white polymer powder.

Regarding Abe and Ishii, applicant argues that the references represent non-enzymatic processes, different from Hwang.

However, as noted above, since Oxazole decrease a quality of any acrylamide, its removal is desirable.

Applicant submits that Murao fails to disclose or suggest the oxazole and/or hydrogen cyanide content in the acrylonitrile starting material.

Examiner submits that purification of acrylonitrile from oxazole and hydrogen cyanide is disclosed in Abe and Ishii references. In particular, Ishii teaches that decreasing a concentration of Hydrogen Cyanide leads to lowering a deactivation rate of an enzyme (See Column 6, line 65).

In general, an artisan always concerns about impurities in the initial reagents. In this particular case one skilled in the art exactly knows from the prior art the effect of presence of oxazole and hydrogen cyanide. It leads to toxicity of the resulting polymer and increases deactivation rate of an enzyme. Therefore, an artisan has a motivation to purify the starting material from those impurities.

Regarding data of Table 1, Examiner submits that the data presented do not commensurate with the scope of the claim 1. Claim 1 claims the amount of oxazole of less than 5 ppm and the amount of hydrogen cyanide of less than 1 ppm. In Comparative Examples 2 and 3 the amount of oxazole is 10 ppm, which as twice as high than the claimed amount. Comparative Examples 2 and 3 disclose amount of hydrogen cyanide as five times higher than the claimed amount.

Applicant argues that Examiner does not compare data of Table 1 with closest prior art. Examiner disagrees. Ishii teaches concentration of Hydrogen Cyanide is equal or less than 1 mg/kg (see Examples 1-3 and Tables 1-3). Abe teaches that where Oxazole is not detected with detection limit of 1.0 mg/kg (ppm). In both cases corresponding claim 1 limitations are met.

In order to compare the Invention with closest prior art, Applicant should demonstrate the data, where initial material is purified with Ishii's and Abe's procedures, polymerize the monomers according Hwang's method and then show the difference between the resulting polymer and inventive one.

Note that the majority of arguments had been discussed in the earlier stages of prosecution (see Office Action mailed on 11/09/2009).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Seidleck/
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